Service d'Astrophysique
SÉMINAIRE

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Jeudi 17 septembre 11h00

CEA Saclay, Orme des Merisiers Bât 709, salle 3 (Rdc)

DISCOVERY OF PHOTON INDEX SATURATION IN THE BLACK HOLE BINARY GRS1915+105

Elena SEIFINA

Sternberg Astronomical Institute, Moscou

We present a study of the correlations between spectral, timing properties and mass accretion rate observed in X-rays from the Galactic BH binary GRS 1915+105 during the transition between hard and soft states. We analyze all transition episodes from this source observed with RXTE, coordinated with Ryle Radio Telescope observations. We show that broad-band energy spectra of GRS1915+105 during all these spectral states can be adequately presented by two Bulk Motion Comptonization (BMC) components: a hard component (BMC1, photon index $\Gamma_1 = 1.7 - 3.0$) with turnover at high energies and soft thermal component (BMC2, $\Gamma_2 = 2.7-4.2$) with characteristic color temperature 1 keV, and the red skewed iron line (LAOR) component. We also present observable correlations between the index and the normalization of the disk "seed" component. The use of "seed" disk normalization, which is presumably proportional to mass accretion rate in the disk, is crucial to establish the index saturation effect during the transition to the soft state. We discovered the photon index saturation of the soft and hard spectral components at values of 4.2 and 3 respectively. We present a physical model which explains the index-seed photon normalization correlations. We argue that the index saturation effect of the hard component (BMC1) is due to the soft photon Comptonization in the converging inflow close to BH and that of soft component is due to matter accumulation in the transition layer when mass accretion rate increases. Furthermore we demonstrate a strong correlation between equivalent width of the iron line and radio flux in GRS1915+105. In addition to our spectral model components we also find a strong feature of "blackbody" bump which color temperature is about 4.5 keV in eight observations of the intermediate and soft states. We discuss a possible origin of this "blackbody-like" emission.

Le cafe sera servi 10 minutes avant
Contact : pascale.chavegrand@cea.fr - Tel : +33 1 69 08 78 27
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